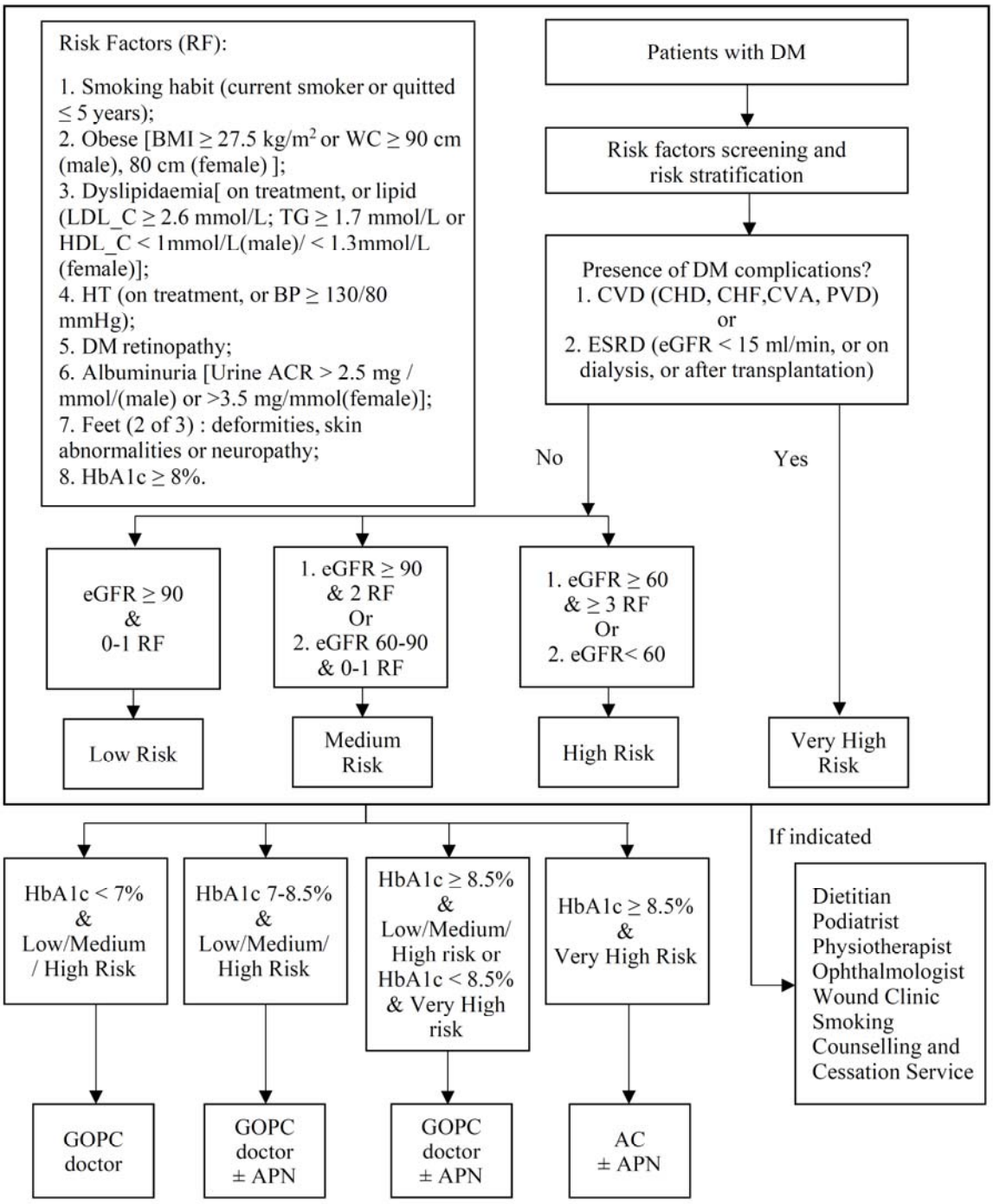
SUPPLEMENTARY DATA

Supplementary Figure 1. Patient Management Flowchart of RAMP-DM



AC, associate consultant; ACR, albumin/creatinine ratio; APN, advanced practice nurse BMI, body mass index; CHD, coronary heart disease; CHF, congestive heart failure; CVA, cerebrovascular disease; DBP, diastolic blood pressure; DM, diabetes mellitus; eGFR, estimated glomerular filtration rate; ESRD, end stage renal disease; GOPC, General Out-patient Clinics; HbA1c, glycated hemoglobin A1c;HDL-C, high density lipid cholesterol; HT, hypertension; LDL-C, low density lipid cholesterol; PVD, peripheral vascular disease; RAMP-DM, Multidisciplinary Risk Assessment and Management Program for patients with Diabetes Mellitus; RF, risk factors; SBP, systolic blood pressure; TC, total cholesterol; WC, waist

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SUPPLEMENTARY DATA

Supplementary Table 1. Unit Cost of Public Health Services Published in 2013 HKSAR Government Gazette

Health Service	Cost (HK$)	Cost (US$) *
GOPC	385 per visit	49 per visit
SOPC	1,110 per visit	142 per visit
A& E	990 per visit	127 per visit
Allied health professionals per visit	550 per visit	71 per visit
Hospitalization		
General ward	4,680 per day	587 per day
Intensive care unit	23,000 per day	2,949 per day
High dependency unit	12,000 per day	1,538 per day

Data source: 2013 HKSAR Government Gazette and hospital authority ordinance (chapter 113)
A&E: Accident and Emergency; GOPC,general out-patient clinic;SOPC,specialist out-patient clinic.
* At a fixed exchange rate of 1 USD=7.8 HKD

Supplementary Table 2. Basic characteristics of the study subjects

Factor	RAMP-DM group (N = 8,570)	Usual care group (N = 8,570)	P-value
Socio-Demographic (%, n)			
Gender			0.482
Female	51.9 % (4,449)	52.5 % (4,495)	
Male	48.1 % (4,121)	47.5 % (4,075)	
Age (mean±SD), year	66.73±11.75 (8,570)	66.59±12.81 (8,570)	0.457
Smoking Status			0.455
Non-Smoker	90.1 % (7,720)	90.4 % (7,749)	
Smoker	9.9 % (850)	9.6 % (821)	
Laboratory Results (mean±SD)			
HbA1c			0.782
%	7.51±1.47 (8,570)	7.52±1.57 (8,570)	
mmol/mol	59 (8,570)	59 (8,570)	

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SBP, mmHg	133.97±17.07 (8,570)	134.34±17.35 (8,570)	0.155
DBP, mmHg	74.44±10.54 (8,570)	74.53±10.18 (8,570)	0.582
LDL-C, mmol/L	3.11±0.83 (8,570)	3.11±0.89 (8,570)	0.634
BMI, kg/m^2	25.28±3.76 (8,570)	25.30±4.01 (8,570)	0.789
TC/HDL-C Ratio	4.44±1.30 (8,570)	4.45±1.43 (8,570)	0.832
Triglyceride, mmol/L	1.65±1.06 (8,570)	1.63±0.97 (8,570)	0.337
eGFR (%, n)			0.14
$\geq 60ml/min/1.73m^2$	90.4 % (7,748)	91.1 % (7,804)	
$< 60ml/min/1.73m^2$	9.6 % (822)	8.9 % (766)	
Clinical Characteristics (%, n)			
Duration of DM, year	8.67±7.63 (8,570)	8.54±7.08 (8,570)	0.25
Hypertension	68.9 % (5,903)	69.3 % (5,941)	0.53
Use of Insulin	3.8 % (326)	4.0 % (346)	0.431
Use of Oral-Diabetic Drugs	89.1 % (7,637)	88.8 % (7,609)	0.495
Use of Anti-Hypertensive Drugs	74.8 % (6,410)	74.3 % (6,368)	0.461
Use of Lipid-Lowering Agents	12.0 % (1,026)	11.8 % (1,014)	0.777
Charlson Index (mean±SD)	4.09±1.15 (8,570)	4.09±1.22 (8,570)	0.695
Service Utilizations			
Hospitalization† (mean±SD)	0.17±0.63 (8,570)	0.17±0.61 (8,570)	0.912
Hospitalization† (median)	0	0	0.289
A&E Attendance (mean±SD)	0.42±1.30 (8,570)	0.43±1.12 (8,570)	0.72
A&E Attendance (median)	0	0	0.278
SOPC Attendance (mean±SD)	1.75±3.26 (8,570)	1.73±2.84 (8,570)	0.774
SOPC Attendance (median)	0	1	<0.001*
GOPC Attendance (mean±SD)	6.00±3.51 (8,570)	6.15±3.18 (8,570)	0.003*
GOPC Attendance (median)	5	6	<0.001*

A&E Accident and Emergency; BMI, Body Mass Index; DBP, Diastolic Blood Pressure; DM, Diabetes Mellitus; eGFR, estimated Glomerular Filtration Rate; HbA1c ,GOPC, General Outpatient Clinic; Hemoglobin A1c; HDL-C, High Density Lipoprotein - Cholesterol; LDL-C,Low Density Lipoprotein - Cholesterol; SBP,Systolic Blood Pressure; SOPC, Specialist Outpatient Clinic; TC,Total Cholesterol

Notes:
§ Propensity score matched subjects based on all the listed parameters.
* Significant difference at 0.05 level by chi-square test, independent t-test or Wilcoxon rank-sum test, as appropriate.
† Stayed at least one overnight in the hospital after admission

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Propensity score matching: To reduce any selection bias, we matched the subjects in the RAMP-DM and control groups using propensity score matching. This technique pairs individuals based on observable characteristics which indicate a similar probability of receiving treatment (similar propensity score), but one of them received the intervention and the other did not. The propensity score is the conditional probability of receiving the intervention given the observed baseline covariates and it is independent of the outcomes. We generated a propensity score for each patient, and modelled the RAMP-DM intervention as the dependent variable with the baseline covariates as the independent variables. The propensity score matching was conducted using the "psmatch2" STATA package by one-to-one matching without replacement and with a caliper of 0.001, which means the differences of propensity scores for each matched pair was within 0.001. The unmatched control subjects were discarded. The baseline covariates for developing the propensity score were listed in Supplementary Table 2

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SUPPLEMENTARY DATA

Supplementary Table 3. Average annual costs of RAMP-DM over 5 years from enrollment (USD)

Items	0-12 months (N=8,570)				12-24 months (N=8,459)				24-36 months (N=8,312)			
	Average No. of intervention	Mean cost per subject	Range (min to max)		Average No. of intervention	Mean cost per subject	Range (min to max)		Average No. of intervention	Mean cost per subject	Range (min to max)	
Intake assessment												
Nurse assessment	1.04	29.49	15.20	40.67	0.55	15.64	8.04	21.51	0.33	9.49	4.82	12.90
Other health professional	0.17	2.95	0.57	5.19	0.07	1.15	0.23	2.14	0.05	0.90	0.17	1.53
Nurse intervention	0.56	13.08	7.25	25.99	0.27	6.41	3.50	12.53	0.28	6.41	3.63	12.99
AC intervention	0.45	13.59	6.12	21.29	0.29	8.85	3.94	13.72	0.26	7.69	3.53	12.30
Total		59.10	29.13	93.13		31.92	15.71	49.89		24.49	12.15	39.72

Supplementary Table 3. Average annual costs of RAMP-DM over 5 years from enrollment (USD) - continued

Items	36-48 months (N=8,156)				48-60 months (N=7,927)			
	Average No. of intervention	Mean cost per subject	Range (min to max)		Average No. of intervention	Mean cost per subject	Range (min to max)	
Intake assessment								
Nurse assessment	0.42	11.79	6.14	16.42	0.29	8.33	4.24	11.34
Other health professional	0.05	0.77	0.17	1.53	0.04	0.64	0.13	1.22
Nurse intervention	0.2	4.62	2.59	9.28	0.18	4.10	2.33	8.35
AC intervention	0.21	6.28	2.85	9.93	0.17	5.00	2.31	8.04
Total		23.46	11.75	37.17		18.08	9.01	28.96

AC, Associate consultant.

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SUPPLEMENTARY DATA

Supplementary Table 4. Average annual costs of health service utilization (USD)

Items	12 months before Baseline		0-12 months		12-24 months	
	RAMP-DM (N=8,570)	Usual care (N=8,570)	RAMP-DM (N=8,570)	Usual care (N=8,570)	RAMP-DM (N=8,459)	Usual care (N=8,125)
GOPC	297±174	258±159	261±141	291±167	241±143	186±175
SOPC	253±475	251±419	293±462	403±551	304±458	489±602
Allied Health	0±10	0±5	7±41	0±5	6±39	0±2
A & E	55±168	54±145	60±147	91±203	65±153	96±264
Hospitalization	743±3,612	795±4,558	1,324±5,784	2,837±8,816	1,678±7,931	3,573±11,227
Total Cost	1,347±3,832	1,359±4,702	1,945±5,978	3,623±9,064	2,293±8,098	4,344±11,445

Supplementary Table 4. Average annual costs of health service utilization (USD) - continued

Items	24-36 months		36-48 months		48-60 months	
	RAMP-DM (N=8,312)	Usual care (N=7,603)	RAMP-DM (N=8,156)	Usual care (N=7,171)	RAMP-DM (N=7,927)	Usual care (N=6,819)
GOPC	224±148	149±162	209±148	136±163	201±154	124±156
SOPC	322±477	489±567	332±473	484±548	344±478	474±539
Allied Health	4±34	0±9	4±32	1±14	4±33	0±11
A & E	65±151	96±243	68±155	86±196	72±156	88±199
Hospitalization	1,798±7,708	3,512±12,094	2,063±8,670	3,022±11,422	2,161±9,040	2,933±10,741
Total Cost	2,414±7,900	4,246±12,301	2,676±8,839	3,729±11,605	2,782±9,187	3,618±10,937

Note: Figures may not add up to the total due to rounding.
A&E, accident and emergency department; GOPC, general out-patient clinic; SOPC, specialist out-patient clinic.

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